

BAC+5

MASTER

Energy

Specialization: Thermal Engineering



An innovative program

The Energy program aims to train high-level executives in the field of energy within the context of Nord-Franche-Comté region, addressing scientific, economics and social challenges related to energy. The program is strategically located in the urban area of Belfort-Montbéliard, closely linked to the local socio-economic dynamics centered around the Energy valley. Administrative oversight for the two specializations falls under the UFR STGI.

This program offers two specializations: Thermal Engineering (TE) and Electrical Engineering (EE), with the CMI Hydrogen-Energy and Energy Efficiency (H3E) integrated into those specializations. Additionally, it contributes to the Graduate School EIPHI through its international specializations in Thermal Engineering and Electrical Engineering.

The teaching staff includes teacher-researchers from the FEMTO-ST institute (CNRS UMR 6174) and the scientific and technical resources center FCLAB (CNRS UAR 2200), along with industry professionals.

This program's attractiveness stems from its strong ties to industry and robust research foundations, attracting students nationally and internationally. Graduates find opportunities across France and abroad.

**Master's program offered both as a full-time program
and through an apprenticeship**

Apprenticeship students spend 40 weeks at university
and 64 weeks in company



UFR STGI

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Internship period

4 to 6 months
(from February to July)

Further studies

- Specialized Master's degrees with dual competency acquisition
- PhD program



● Objective of the training

The Thermal Engineering (TE) specialization is built upon a fundamental scientific education in energy sector (thermal and fluid mechanics, energy efficiency and optimization, thermal and fluidic metrology, and numerical simulation). To support the energy and technological transitions in our society, the master's program emphasizes energy efficiency broadly, as well as energy sector in industry, buildings (air conditioning, heating, refrigeration), and transportation. These teachings are complemented by technological modules focusing on decarbonized hydrogen production and nuclear energy. The program emphasizes project-based learning through the integration of practical work, projects, and specific courses. Innovation through research is taught through dedicated modules and seminars involving researchers, as well as industry and socio-economic stakeholders. Industrial partnerships, particularly with local energy actors, are central to technological teachings (lectures, projects, seminars, site visits).

Graduates typically find employment abroad primarily in neighboring countries (Switzerland, Germany, Belgium, Luxembourg, Italy), and to a lesser extent in Canada, Nordic countries, and China.

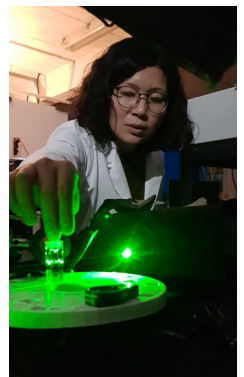
Contract types (fixed-term or permanent) depend on the economic conditions for the first job. After graduation, around 80% of graduates are employed on fixed-term or permanent contracts, and after 30 months, more than 90% are employed on permanent contracts.

The sectors in which these professionals operate are highly diversified:

- Industrial energy
- Building sector
- Renewable energies
- Transportation (automotive, rail, aerospace, maritime...)
- Local authorities
- Associations
- Studies and consulting firms

The thermal engineer:

- designs and implements energy production, management, and distribution systems
- writes bill of specifications
- performs thermal and fluidic modeling and simulations
- conducts an experimental approach
- analyzes test results and processes data
- oversees installation design and project monitoring
- ensures the quality of the final deliverables
- proposes new technological solutions addressing technological, environmental, and societal challenges.





● Specific skills required

- Solid scientific knowledge and technical expertise
- Knowledge in thermal and energy calculation methods
- Mastery of thermal simulation software and fluid mechanics
- Understanding of current technical regulations
- Ability to work effectively in teams
- Project management skills: organization, coordination, and leadership
- Curiosity and proactivity in staying updated on technical and scientific innovations
- Implementation of a socially responsible approach
- Interpersonal and writing skills
- Proficiency in English, and being familiar with a second foreign language

● Profile

- M1: students holding a Bachelor's degree in a related field or equivalent
- M2: students holding a master's degree in the same field or an engineering degree
- Possibility of Recognition of Prior Learning through professional experience

● Career opportunities

Career opportunities typically include:

- Business development manager
- R+D engineer
- Energy advisor for local authorities
- Design and/or project engineer
- Test engineer
- Technical sales engineer
- Project manager
- Manager of a testing and/or qualification laboratory
- Consultant



Source : GE Courtesy



Training content

First year

Semester 7

- Industrial sphere
 - English
 - Professional communication
- Fluid mechanics
 - Fluid dynamics
 - Introduction to Computational Fluid

Dynamics (CFD)

- Transport phenomena
 - Forced and natural convection
 - Heat exchangers
 - Complex transfers
- Engineering Sciences
 - Acoustics and vibration of systems
 - Fluid machinery technologies
 - Refrigeration machines and heat pumps
- Integrative project

Semester 8

- Industrial sphere
 - English
 - Project management
 - Energy transition economics
- Energy production
 - Nuclear and Hydrogen-Energy
 - Turbomachinery
 - Combustion
- Modeling in energetics
 - Computational codes in fluid dynamics and finite elements
 - Numerical methods and mathematical tools for engineers
- Energy efficiency
 - Energy efficiency in buildings and Life Cycle Assessment (LCA)
- Renewable energies
- Refrigeration systems
- Integrative project

Find all the information on our
website:

stgi.uml-p.fr



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Second year

Semester 9

- Industrial sphere
 - English
 - General culture
 - Entrepreneurship
- Thermal systems
 - Conventional thermal power plants
 - Fluid and energy management
 - Technological practical work
- Numerical engineering
 - Calculation codes in thermal and fluid dynamics
 - Dynamic thermal simulation
 - CAD-CAM software
- Building energetics (option)
 - Heating and air conditioning
 - Energy business management
 - Building thermal science
- Advanced energetics (option)
 - Advanced metrology
 - Innovative energy machines
 - Exergy analysis
- Integrative project

Semester 10

- Internship (24 weeks)

Advantages:

- Individualized support throughout the program (every semester over the 2 years).
- Tutored projects (every semester over the 2 years) on energy systems related to the Electrical Engineering specialization.
- Practical internship (24 weeks, excluding apprenticeship periods, during the final semester of the second year) in a company, local authority, or laboratory.
- Apprenticeship program (each semester over 2 years).

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